What is claimed is:

CLAIMS

1. A method comprising the steps of:

receiving, by a first receiver, a first received signal comprising a first signal and a second signal;

receiving, by a second receiver, a second received signal comprising the first signal and the second signal;

determining at least one branch weight associated with the first receiver and at least one branch weight associated with the second receiver;

combining the at least one branch weight associated with the first receiver, the at least one other branch weight associated with the second receiver, the first received signal, and the second received signal, forming a combined signal;

determining channel state information for the combined signal; and

restoring the channel state information of the combined signal.

2. The method of claim 1, wherein the step of combining comprises the steps of:

applying the at least one branch weight associated with the first receiver to the first received signal, forming a first weighted branch signal;

applying the at least one branch weight associated with the second receiver to the second received signal, forming a second weighted branch signal; and

combining the first weighted branch signal and the second weighted branch signal to form a combined signal.

3. The method of claim 1, wherein the steps of determining channel state information and restoring comprise the steps of:

determining a mean square error estimate for the combined signal; and

applying a function of the mean square error estimate to the combined signal.

4. The method of claim 3, wherein the step of applying the function of the mean square error estimate comprises dividing the combined signal by the mean square error estimate.

5. The method of claim 3, wherein the mean square error estimate, *MSE*, is based on processing at least one of a decision-directed error signal and a pilot symbol directed error signal over a plurality of symbol intervals.

6. The method of claim 3, wherein the mean square error estimate, *MSE*, is determined by:

$$MSE = \mathrm{E}\left\{\left|x_d\right|^2\right\}\left(1 - 2\,\mathrm{Re}\{\underline{w}^T \underline{g}_d\}\right) + \underline{w}^H \Phi \underline{w} .$$

7. The method of claim 3, wherein the mean square error estimate, *MSE*, is determined by:

$$MSE = \mathrm{E}\left\{\left|x_d\right|^2\right\}\left(1 - \mathrm{E}\left\{\left|x_d\right|^2\right\} \underline{g}_d^T \Phi^{-1} \underline{g}_d^*\right).$$

8. The method of claim 1, wherein the step of restoring comprises outputting the combined signal and the channel state information as separate quantities.

9. The method of claim 1, wherein the first receiver is a branch receiver and the second receiver is a branch receiver.

10. The method of claim 1, wherein the first signal is transmitted by a first transmitter and the second signal is transmitted by a second transmitter.

11. The method of claim 1, wherein the step of determining further comprises the step of determining at least one channel response for the first signal and at least one channel response for the second signal.

12. The method of claim 11, wherein any channel response comprises a complex channel gain.

13. The method of claim 11, wherein any channel response comprises multiple complex channel gains at various times.

14. The method of claim 1, wherein the first signal comprises at least two different instances of a predetermined sequence, further comprising the step of determining variations in channel response between the different instances of the predetermined sequence.

15. The method of claim 1, further comprising the step of identifying a predetermined sequence within the first signal.

16. The method of claim 15, wherein the predetermined sequence comprises a pilot code.

17. The method of claim 1, further comprising the step of identifying a predetermined sequence within the second signal.

18. The method of claim 17, wherein the predetermined sequence comprises a pilot code.

19. The method of claim 1, further comprising the step of utilizing pilot code from at least one of the first signal and the second signal to determine the at least one branch weight associated with the first receiver and the at least one branch weight associated with the second receiver.

20. The method of claim 1, wherein the first signal is a time division multiple access (TDMA) encoded signal and the second signal is another TDMA encoded signal.

21. The method of claim 1, wherein the first signal is an orthogonal frequency division multiplexed (OFDM) encoded signal and the second signal is another OFDM encoded signal.

22. The method of claim 1, wherein the method steps are implemented as computer readable program code within a computer-readable signal bearing medium.

23. An apparatus comprising:

a receiver that receives a first received signal comprising a first signal and at least one other signal;

at least one other receiver that receives one other received signal comprising the first signal and at least the one other signal;

a branch weights determiner, operably coupled to the receiver and the at least one other receiver, that derives at least one branch weight associated with the first received signal and at least one other branch weight associated with the one other received signal;

a signal combiner, operably coupled to the branch weights determiner, wherein the signal combiner combines the first received signal weighted by the at least one branch weight and the at least one other received signal weighted by the at least one other branch weight, yielding a combined signal;

a mean square error estimate determiner, operably coupled to the branch weight determiner, that determines a mean square error for the combined signal; and

a channel state information restorer, operably coupled to the signal combiner and the mean square error estimate determiner, that applies a function of the mean square error estimate to the combined signal to restore a soft decision component of the combined signal.

24. The apparatus of claim 23, further comprising a symbol discriminator, operably coupled to the branch weights determiner, that determines one or more channel responses associated with the first signal and one or more channel responses associated with the at least one other signal.

25. The apparatus of claim 23, wherein any channel response comprises a complex channel gain.

26. The apparatus of claim 23, wherein any channel response comprises multiple complex channel gains at various times.

27. The apparatus of claim 23, wherein the first receiver is a branch receiver and the one other receiver is a branch receiver.

28. The apparatus of claim 23, wherein the first received signal is transmitted by a first transmitter and the one other signal is transmitted by a second transmitter.

29. The apparatus of claim 23, wherein the first signal comprises at least two different instances of a predetermined sequence, the apparatus further an determiner of variations in channel response between the different instances of the predetermined sequence.

30. The apparatus of claim 23, further comprising an identifier of a predetermined sequence within any of the first signal and the at least one other signal.

31. The apparatus of claim 30, wherein the predetermined sequence comprises a pilot code.

32. The apparatus of claim 23, wherein the branch weights determiner is arranged and constructed to utilize pilot code from at least one of the first signal and the one other signal to determine the at least one branch weight and the at least one other branch weight.

33. The apparatus of claim 23, wherein the first signal is a time division multiple access (TDMA) encoded signal.

34. The apparatus of claim 23, wherein the first signal is an orthogonal frequency division multiplexing (OFDM) encoded signal.

35. The apparatus of claim 23, wherein the mean square error estimate, *MSE*, is based on processing at least one of a decision-directed error signal and a pilot symbol directed error signal over a plurality of symbol intervals.

36. The apparatus of claim 23, wherein the mean square error estimate, *MSE*, is determined by:

$$MSE = \mathrm{E}\left\{\left|x_d\right|^2\right\}\left(1 - 2\,\mathrm{Re}\{\underline{w}^T \underline{g}_d\}\right) + \underline{w}^H \Phi \underline{w} \,.$$

37. The apparatus of claim 23, wherein the mean square error estimate, *MSE*, is determined by:

$$MSE = \mathrm{E}\left\{\left|x_d\right|^2\right\}\left(1 - \mathrm{E}\left\{\left|x_d\right|^2\right\}\underline{g}_d^T \Phi^{-1} \underline{g}_d^*\right).$$

38. The apparatus of claim 23, wherein the apparatus is comprised at least in part of a computer-readable signal bearing medium comprising computer readable program code.